

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 03 June 2005 see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2005/000948

International filing date (day/month/year)
28.01.2005

Priority date (day/month/year)
22.03.2004

International Patent Classification (IPC) or both national classification and IPC
C07C45/50, C10G3/00

Applicant
EXXONMOBIL CHEMICAL PATENTS INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1b/s(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2005/000948

03400000 1100389 005

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2005/000948

Box No. V Reasoned statement under Rule 43b/s.1(a)(I) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-19
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

PCT/EP2005/000948

Re Item V**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: US-A-4 593 127 (BUNNING ET AL) 3 June 1986 (1986-06-03)
D2: US-A-4 760 194 (PHILLIPS ET AL) 26 July 1988 (1988-07-26)
D3: DE 100 35 370 A1 (BASF AG) 22 March 2001 (2001-03-22)

Novelty

1. The document D1 discloses a continuous process for the hydroformylation of propylene comprising feeding a stream containing 98% propylene, and a synthesis gas stream containing hydrogen in molar excess over carbon monoxide, to a hydroformylation reactor comprising a Rh catalyst, wherein the ratio of the syngas over the propylene is greater than 1.93 (see Table 2).

The subject-matter of claim 1 differs over that of D1 in that the feed rate of the propylene stream equals at least 3 tonnes per hour, i.e., the process of claim 1 is carried out at industrial scale (description: page 3, ln. 17-20).

2. The document D2 discloses a continuous process for the hydroformylation of propylene comprising feeding a stream containing only propylene, and a synthesis gas stream containing hydrogen in molar excess over carbon monoxide, to a hydroformylation reactor comprising a Rh catalyst, wherein the ratio of the syngas over the propylene is between 1.2 - 6 (see corresponding citations in ISR).

The subject-matter of claim 1 again differs over that of D2 in that the process is carried out at industrial scale instead of bench scale.

3. Document D3 shows a continuous process for the hydroformylation of propylene at industrial scale, the propylene feed being of polymer grade, however no ratios are given of the amounts of synthesis gas and propylene used (see citations in ISR).

4. Claim 1 is therefore new in view of documents D1, D2 and D3 (Article 33(2) PCT).

Inventive Step

5. As noted above the difference between the processes of claim 1 and document D1 is the scale at which they are carried out. The person skilled in the art of hydroformylation would however, in order to scale up the process to industrial scale as according to customary practice, increase the feed rate to 3 tonnes per hour, without the exercise of inventive skill, and thereby arrive at the subject-matter of claim 1.

6. Also document D2 differs from claim 1 in the scale of the process. Again the skilled person would scale up the process, by increasing the feed rate to 3 tonnes per hour, without the exercise of inventive skill, as according to customary practice. Moreover, D2 suggests the industrial application of the process disclosed therein (see col.2, ln.1-5).

7. It is noted that while it is likely that during upscaling the use of "pure" propylene as disclosed in D2 for the bench scale process would not be feasible at industrial scale. The skilled person would however in place thereof employ the next highest purity of propylene possible: polymer grade propylene (i.e. >97% propylene), which is disclosed for use in an industrial scale Rh-hydroformylation process in document D3.

8. The subject-matter of claim 1 therefore, does not involve an inventive step in the sense of Article 33(3) PCT.

9. Dependent claims 2-19 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, as they are either disclosed in D1 and/or in D2 (see the corresponding passages cited in ISR), or because they are part of customary practice followed by the person skilled in the art.